A daily renewal of the salicylic wool during the first three days is desirable, after that no further dressing is required. The knot at the site of the operation slowly disappears, and at the end of three weeks the patient can safely walk about, using, however, a suspensory bandage, and being careful to avoid strain, pressure, or fatigue of the part.

The disappearance of the last traces of the knot demands a month or two for its accomplishment, but eventually no trace remains of the operation having been performed.

THE TRETAMENT OF FRACTURES OF THE LOWER END OF THE RADIUS.[1]

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AT the outdoor department of the Roosevelt Hospital, a not inconsiderable number of fractures of the lower end of the radius present themselves, which have already been seen by physicians in private practice, and after the reduction of the deformity and the application of an apparatus, have been referred to us for treatment, because the patients are impecunious; or which have received the first care at some other hospital or dispensary, and are sent to us because the patients reside in the neighborhood. In this way, and through conversation with various surgeons and physicians in the city, I have had opportunity to note the different modes of treatment adopted by a great number of surgeons, and in a number of the hospitals in the city.

In the claim of a particular apparatus, and the treatment of the fracture, two ideas seem to me to have special weight with

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[1] Read before the New York Surgical society March 23, 1886.

New York surgeons. First, that by leaving the wrist and hand free, and allowing it to fall into a position of adduction, we at once reduce the displacement of the hand toward the radial side, and prevent the partial ankylosis of the wrist and the rigidity of the tendons and small joints of the hand, so much dreaded in this fracture; and, second, that to avoid this latter condition it is necessary and advisable to commence passive motion at an early period, long before the consolidation of the fracture, and to continue this during the healing process.

A conviction, founded on both theoretical considerations and on a considerable practical experience, that both these views are incorrect, is my only excuse for bringing so well worn a subject to the notice of the Society.

It will, probably, be a relief to the minds of my hearers to know that I have no new apparatus to present, no new mode of treatment to propose, and that I do not claim to cure all cases without deformity or ankylosis.

My only object is to express my conviction that certain precautions usually considered necessary, are not generally so; and that in the case where the dangers feared are real, the precautions taken are, at best, useless, and often injurious.

In clinging to the conviction that adduction of the hand, maintained either by its own weight, as in the methods of Cline and Brasnby Cooper, or by the pistol-shaped splint of Goyrand or Nélaton, our surgeons are scarcely to be excused, since the fact that this treatment is founded on a false view of the nature of the displacement, and is useless to overcome it, has been fully demonstrated by three, at least, of the authorities most frequently consulted, Malgaigne (*Traite des Fractures*, etc., t. i. p. 616), Hamilton (*A Practical Treatise on Fractures and Dislocations*, p. 300), and Stimson (*A Treatise on Fractures*, p. 460).

For the practice of leaving the wrist and hand free, to allow of active and passive motion, or of removing the apparatus at short intervals during the consolidation, for the same purpose, much more weighty authority can be cited. Indeed, almost all the authorities insist upon the importance of one or the other of these measures. As instances may be cited Malgaigne (op. cit., t. p. 617), who allowed the splints to descend only as far as the first row of carpal bones, in order to be able to make moderate movements. V. Pitha (*Handb. der allg. und spec. chir.*, Billroth and Pitha, Bd. 4, Abt. 2, S. 102) advises the same. Hamilton (op. cit., p. 309) seems to advocate complete rest, as a rule, but states that when a fracture extends into the joint, early passive motions must be made to prevent ankylosis. Erichsen (*Science and Art of Surgery*, vol. 1. p. 575) says: "After the first week it is well, especially in elderly people, to leave the fingers free, and to encourage movement of them, lest that painful stiffness result which is so common a result of the accident. Passive motion of the wrist-joint may, however, often be commenced with great advantage to the patient before the union of the fracture, more particularly when it is impacted," and predicts very troublesome stiffness if the hand and fingers be kept fixed during the whole time. Packard (Ashurst's *Internat. Encyclopædia of Surg.*, vol. iv. p. 177) advises that passive motion should be made only in exceptional cases "where there is a strong tendency to stiffening, such as sometimes occurs in old people,or where the violence producing the injury has been very great." Stimson (op. cit., p. 184) recognizes the principle that immobilization is indicated, as a rule, in injuries involved close to joints; but adds, "in the smaller joints of the hand the case is different. There the extended position and immobility favor stiffening, even when the fracture involves only the forearm or arm; and, therefore, should be left free, or dressed in the fixed position and moved every day." And again (p. 146), "the indications are of two kinds: to immobilize the fragments, and to allow passive and voluntary motions of the fingers in order to prevent or diminish their subsequent stiffness."

Schede (Zur Behand. des typischen Bruches der unteren Radiusepiphyse; *Verhand. der Deutschen Gesell. für Chir.*, 1882, p. 68) recommends that the fingers should be left free and the patients encouraged to make active and passive motions with them, and that the splints should be removed every eight days to allow of passive motion, removing them finally in three weeks. The discussion which followed turned rather on the relative merits of various splints, especially as compared with plaster of Paris, rather than on the question of early motion; but Schüller, Langenbeck, and Billroth stated that they always used plaster as a permanent dressing, leaving the fingers free, and without ever seeing stiffness as a result. Billroth stated that the cases in which there was a tendency to ankylosis and much stiffness were those due to great violence, the fracture penetrating the joint, or with great effusion of blood and inflammatory products.

It will be observed that some of the authorities quoted above advocate early motion only in the more severe cases, If, however, the principle which I advocate is correct, that motion of an injured joint and of the parts surrounding it will only increase the inflammatory process, give us a greater quantity of provisional callus, and cause more effusion into the ligaments and sheaths of tendons, with consequent greater subsequent rigidity, it follows that the worse the case the more harm will be done by disturbing the parts, and the stronger indication we have for more perfect and prolonged immobilization. Some, as Stimson, advocate fixation of the wrist, but leave the fingers free, and consider active and passive motion of these of great importance.

Like almost all surgeons, I leave the fingers free also, but merely because this allows them to fall into a natural and easy position of flexion, and the hand being enclosed in splints and carried in a sling, the patient is under no temptation to attempt much motion.

That fixation in the constrained and unnatural position of complete extension should cause rigidity and discomfort, I can well understand, and have often had opportunity to verify by observation; but if immobilization be advisable in cases of injury to larger joints, or in their neighborhood, I know of no reason why it should be injurious in the case of the smaller.

As a matter of fact, I have frequently, in the treatment of fractures of the metacarpal bones with sinking in of the knuckles, kept all the fingers flexed over the end of the padded splint, and completely immobilized for a month continuously, and have never noticed the slightest stiffening as a result.

Verneuil (*Bull. et Mem. de la Société de Chir. de Paris*, t. 5, p. 487) combats with great ability the idea that ankylosis of an inflamed or injured joint is promoted by immobilization; shows that prolonged fixation of a healthy joint has never been known to lead to such a result; that the ankylosis is due to the inflammation of the joint and of the surrounding parts, and that the first requisite for preventing or subduing inflammation here as elsewhere is complete rest of the part.

In giving the mode of treatment adopted by us in these fractures, I would not be understood to advocate the particular kind of splint applied as better than any others in which the same principles of treatment are recognized—they have been used merely because they are cheap, and readily and rapidly applied. Neither have we found one mode of treatment applicable to all cases; where there has been a great tendency to recurrence of the displacement, special means have occasionally been necessary to prevent this. The cases of which I have histories represent really only a small proportion of those at the Roosevelt Hospital during this time; they are, however, by no means selected cases. If there has been any selection it has been of the more severe cases which demanded my personal attention.

In a large number of cases no history was taken, because deformity, crepitus and mobility were absent, almost the only sign of fracture being the great tenderness on pressure. Were these cases included, it would be open to any one to question a diagnosis made on such grounds. These cases, however, have always been a perfect result as regards freedom from ankylosis and stiffness.

A certain number of other cases have not been recorded, owing to the pressure of work and to the confusion incident to moving from crowded quarters to a new building.

Of seventy-one cases in which histories have been kept, eight are useless, because no statement is made of the condition of the parts at the time of discharge sufficiently definite to be of value. Twenty-eight disappeard before the splints were finally removed. This leaves forty-one cases in which the exact result has been carefully noted.

The principles of treatment have been the following: Complete reduction of all deformity when patient is first seen. In only one case was it necessary to give ether to accomplish this.

Application of antero-posterior splints extending from the elbow to the metacarpo-phalangeal articulation.

Inspection of the parts at intervals of two or three days during the early part of the treatment, and later at intervals of a week.

In two or three cases only the simple antero-posterior splints have not sufficed to retain the parts in position, when we have applied either Roser's apparatus, a long dorsal splint, with a wedged-shaped pad, keeping the wrist flexed, or strong iron strips, bent so as to give flexion with slight adduction.

The splints have been kept in place for from four to five weeks, no passive motion being made.

When the splints have been removed, the arm has been examined by all the surgeons present, usually at least three or four, often more, and the result noted as perfect only when all were agreed.

The patient has usually been instructed to carry the arm in a sling for a week longer, and not to attempt any laborious work for at least three weeks more. Of these forty-one cases the result as regards absence of any deformity, and either perfectly normal movements of the wrist and fingers, or so little stiffness that the functions were practically normal, has been recorded as perfect in thirty-one.

A similar result as regards motion, but with slight deformity, has been noted in five more cases. In one of these the patient had not presented himself from the time the splints were applied until the day on which they were removed.

In another case it is noted that active motion at the wrist is slight, but passive motion perfect, and very slight deformity. In another case, in which the injury was due to great violence, the impaction of the radius was so firm, and the displacement of the ulna so marked that etherization was necessary, and even then the deformity was reduced with great difficulty, and not quite perfectly. When the splints were removed, dorsal flexion was fair, palmar only to a slight extent, due, it is noted, to the severity of the original injury and the flexed condition in which it was necessary to keep the wrist to prevent a return of the displacement. Finally, we have three cases in which slight or well-marked silver-fork deformity resulted with, in two, marked displacement of the hands toward the radial side.

In one of these, a man of 72, an active eczema was developed under the splints immediately after their application, so severe that the patient would tolerate no apparatus whatever. No rigidity of the wrist or fingers occurred.

The other two patients were discharged after the usual treatment, the result being noted as very good. Being again under observation some months later, slight silver-fork deformity was noted with well-marked displacement of the hand toward the radial side. In one of these there was reason to believe that the deformity was due to disregard of our instructions, as to undertaking hard work immediately after the removal of the splints. I had a similar experience some years ago when, after discharging an elderly woman at the end of four weeks with a very good result, in defiance of my instructions she at once commenced hard work at a scrubbing board, and presented herself some three months later with one of the worst deformities that I have ever seen. I would call attention to this as being one of the ways in which blame may be unjustly attached to the surgeon.

In the third case, besides deformity, there was decided weakness of the flexor muscles of the hand, apparently due to an effusion into the sheaths of the tendons. I am at a loss to account for the late appearance of the deformity, as the patient really seemed to have done no work since his discharge. He was receiving a weekly allowance from a society, and the continued weakness may have been due to long-continued voluntary disuse of the muscles.

I am far from maintaining that good results may not be attained in particular cases by the methods which I condemn, but holding, as I do, that the principle of early passive motion for injuries near to or involving joints is wrong, I must regard them as having been attained in spite of, and not in consequence of, the treatment.

As incidental points of interest in these cases, I may mention that in three the fracture was distinctly stated to have been produced by forced palmar flexion. In two of these the deformity had been partially reduced before the patients were seen, so that I am unable to give the direction of the original displacement. The third, a very intelligent man who gave a clear and positive account of how the accident occurred, presented the silver fork deformity of a typical Colles. One case presenting the regular deformity was alleged to be due to direct violence, a heavy board having fallen on the wrist.

Another, a man, presented himself with an unimpacted fracture of the lower end of the radius and no deformity. On touching the parts a violent spasm of the extensors of the thumb and of the radial extensors of the wrist threw the parts into a perfect silver-fork position, the spasm causing severe pain and lasting several seconds. This could be made to recur a number of times and be carefully observed.

One case presented an oblique fracture running from above and internally downward and outward into the joint, so as to chip off a triangular fragment from the internal portion of the lower end of the radius; the fragment, of course, did not include the styloid process.

DISCUSSION.

Dr. H. B. SADNS said he did not suppose that the members of the Society would come to any agreement on the chief point raised by Dr. Hall because their experience doubtless had differed, whereas the results had generally been good. His own attention was called to the point of the avoidance of passive motion by reading Verneuil's very able discussion of the subject in 1879. He confessed that he had often been disappointed in attempting to secure the results said to have been obtained by passive motion. His practice had been very much like that advocated by Dr. Hall, and he was prepared to endorse the views that had been advanced. He believed that mistakes were frequently made by resorting to passive motion early in all cases of fracture in the neighborhood of joints. In the case of one joint he thought all surgeons would agree that passive motion should not be resorted to, and that is fracture in the neighborhood of the hip-joint. The usual plan of treatment was to adjust a posterior splint and allow the limb to remain in a fixed position for at least six weeks; at the end of that time Dr. Sands thought there was not, as a rule, any stiffness to be observed at the coxo-femoral articulation. He had been frequently disappointed in attempting by means of passive motion to restore or preserve the mobility of the wrist-joint. He believed that in some cases immobility is inevitable. He had treated the fracture under consideration in both ways; that is, by complete immobilization, and by resorting to early passive motion, and by each method had occasionally been disappointed in the results when the accident occurred in old persons. But when the comparison came to be made between the results obtained by the two methods, he had no hesitation in saying that passive motion had been resorted to much too often and much too early. He had frequently noticed in fracture in the neighborhood of the elbow-joint occurring in children, that the joint, after the fracture had united, was very stiff and the tissues about it more or less thickened, and the conditions such that all efforts on the part of the surgeon to restore complete mobility by passive motion were futile; but he had seen some of these patients at a subsequent period, and had been both surprised and pleased at the result, for the inflammatory products had disappeared, and the arm, being left to perform its natural movements, had become quite supple. At the same time he did not wish to go so far as always to condemn an early resort to passive motion, for he had seen cases in which it had been the means of bringing about mobility where otherwise such motion would have been ost. But, as a general rule, it would be better to let nature have her own way rather than attempt to force it by early resort to passive motion, and so far as his experience went he was prepared to endorse the rule advised by Dr. Hall.

Dr. Yale said that, from his own experience, prolonged rest of a joint is not productive of the ankylosis often attributed to it. Not only with diseases of joints, but with fractures in the neighborhood, it had been his habit to keep them in a fixed position rather a long time than otherwise, and he had not been troubled subsequently with ankylosis. Furthermore, he had seen some cases in which immobilization had not been the cause of ankylosis when it did occur. He recalled one case in particular, that of an elderly lady who fell down some steps and broke her humerus. The splint which was applied fixed the elbow and shoulder-joints, but the hand was intentionally left free so that it should not become ankylosed. In the results the elbow and shoulder-joints were free very much earlier than were the joints of the hand, which were never fixed in a splint nor suffered any injury. He was obliged to work for several weeks with passive motion before succeeding in limbering up the joints of the hand.

Dr. L. S. Pilcher said that he was fully in accord with the idea of immobilization of joints, as a rule, either when they are themselves the seat of an injury, or when the parts in the immediate neighborhood have been injured; for it had seemed to him that in attempts at early mobilization there is danger of increasing or prolonging irritation by the movements of the fragments, movements caused by the contraction of those muscles which are inserted into the immediate neighborhood of the affected parts, these contractions being both voluntary and involuntary, provoked by passive motion. The main reason why passive motion should not be used would be found in these results, and not in anything produced in the joint itself.

But in this injury at the wrist-joint there is an entirely different condition of affairs; in fracture at the lower end of the radius we do not by passive movements set in motion muscles which are attached in the immediate neighborhood of the affected part. The only muscle which could be brought into motion is the pronator quadratus—all the other muscles terminate in tendons which pass beyond the affected parts, with the exception of the supinator longus, which in the ordinary movements of flexion of the joint is not brought into use at all. The great masses of the extensors and the flexors are not so related to the injury as either voluntarily or involuntarily to produce movements of the parts which may increase irritation, while the movements of the articular surfaces upon themselves produced by passive motion are innocuous.

It seemed to him that in these injuries the greatest difficulty with which we had to contend, and the evil results of which we wished to avoid, was the tendency to effusion and subsequent adhesion along the sheaths of the tendons, and that in the movements properly guarded which may be produced at a very early date the formation of these adhesions may be prevented, adhesions which, if not prevented, will produce after-stiffness of the parts for a considerable period, and sometimes render the joints useless. His own practice during the last twelve years had been based upon this theory, and during this time he had thrown aside entirely splints of all kinds. After the fragments have been properly replaced he simply encircles the part by a band of adhesive plaster an inch and a half wide, which pretty firmly binds them together. This he reinforces by a roller bandage applied to the hand and forearm, which gives a sense of greater security, and diminishes the tendency to fluxion present in the earlier days of the injury. In this way the hand and the fingers are left to the natural movements. By this method he had treated patients of all ages, and the result had been uniformly satisfactory, certainly much more satisfactory as regards functional result than the results usually expected to be attained by surgeons. As an illustration of the method, he presented a patient, a woman æt. 45, who a little more than two weeks previously had fallen upon the pavement and sustained in the usual way fracture of the lower extremity of the radius, at the same time tearing off the styloid process of the ulna also.

He further remarked that in only two cases had he applied any other dressing after the receipt of this injury, and in both instances it was done simply to satisfy the fears of either the patient or the friends. In one case a circular starch bandage was used which completely immobilized the wrist, and in the other Levis's metallic splint was used.

Of course, he appreciated the fact that very great differences exits in the character of the injuries which we are in the habit of placing under the general head of fracture of the lower extremity of the radius, and that in cases of severe comminution of the lower fragments particularly it might be desirable to immobilize the wrist-joint. But in the ordinary cases, where the lower fragment is simply torn off, with more or less displacement, without such a degree of injury of the parts about the wrist-joint as to produce a very serious complication of the case, it seemed to him that in the simple retentive bandage there is given a sufficient apparatus for the successful management of these cases, and after an experience of these years, which has been reinforced by the experience of many others who had used the same method, he was ready to believe that it is sufficiently efficient, and that it will give just as good results as the use of splints. In the application of the bandage he would say that it is always a matter of first importance accurately to reduce the fragments, and after that a simple circular bandage in the great majority of cases will be found sufficient to carry it to a satisfactory conclusion.

Dr. C. K. BRIDDON said that for more than eight years he had a service in the New York Dispensary, where there were treated between four and five hundred fractures of the lower end of the radius, nearly all of which came under his supervision. In the early part of that period they were treated by immobilization by the ordinary pistol splint, and no passive motion was used until at the end of four or five weeks, and in a large percentage of these cases fair results were obtained, stiffness remaining only for a short period of time. In other cases, treated by the use of the dorsal in addition to the palmar splint, the results were unsatisfactory as regards subsequent mobility of the joint.

His impression had always been that the stiffness which follows this injury does not depend so much upon the character of the treatment, or immobilization, or passive motion, as upon the nature of the injury itself. In the simple fractures very good motion is usually obtained, although in some cases there is stiffness of the fingers.

He certainly reached one conclusion during his term of service, and that was, no matter whether the case was treated with plaster-of-Paris splint or with a short pistol splint, or otherwise, a great deal of mischief was done by the dorsal splint. In all the latter part of his service in the dispensary he never used the dorsal splint, but especially the pads, which were commonly placed upon it, and also upon the plantar splint, in the neighborhood of the fracture. He had found that they produced inflammation of the sheaths of the tendons, and that an undue degree of stiffness remained. For a number of years he had not used any posterior splint at all, but had simply employed a curtailed anterior splint, padding the radial aspect of the splint to fill up the concavity of the forearm, and leaving the ulnar portion of the splint free, and he had obtained fair results.

He thought that a good deal of the deformity and of the stiffness which remained in these cases was due to the fact that the fracture was not reduced. It is sometimes exceedingly difficult to make complete reduction, and that difficulty does not occur in bad fractures, but in cases in which the lesion is moderate, involving the bone simply, and not tearing away the fibrous structures of the joint, which continue upward in the periosteum for a distance above the usual site of fracture. In the cases in which considerable damage is done the mobility of the parts is such that they are easily restored. If, therefore, great care is taken to reduce the fracture completely, the fragments will be retained in position with the simple treatment devised by Dr. Pilcher; but where there is considerable damage done to the parts about the joint he believed that to depend upon a simple retentive bandage would be liable to be followed by a good deal of mischief and bad results; at least that had been his personal experience, as he had treated some cases, not many, with the simple retentive apparatus, and the swelling and inflammation had gone on increasing, and he thought that the swelling and inflammation were consequent upon the mobility permitted by the simple retentive dressing. He could not conceive that, where there was much mobility of the parts, this simple retentive bandage would answer. He did not wish by any means to condemn the method advocated by Dr. Pilcher, but simply to state that such was the result in the few cases in which he had attempted to treat the fracture in that way,

Dr. J. C. Hutchison said that for a number of years he had treated fractures of the lower end of the radius in the manner shown on the patient introduced by Dr. Pilcher, which, it was only fair to say, was brought to the attention of the profession by Dr. Moore, of Rochester, in a paper read before the Medical Society of the State of New York many years ago, in which he expressed the opinion that there was with this fracture dislocation of the ulna in more than half of the cases. Dr. Moore cited five cases which he thought established his view. They were all severe cases, and probably there was dislocation of the ulna. His method consists in applying a compress over the lower end of the ulna, which is retained in position by surrounding it with adhesive plasters, as seen in Dr. Pilcher's case. Since then Dr. Hutchison had adopted this method almost invariably, and with most satisfactory results. There has been much less stiffness of the fingers, less ankylosis, and less pain than in the use of former methods, and the treatment was much less troublesome to the surgeon than any which he had employed. He agreed entirely with the statement made with reference to the satisfactory results obtained by this method of treatment. Of course, perfect results were not to be expected in every case by any method of treatment.

Dr. PILCHER said that in previous discussions of this subject he had credited Dr. Moore with his suggestion concerning the pathology and treatment of these fractures, and it might not be out of place to state again that the turning of his attention to the possibility of doing away with the splint was due to Dr. Moore's original paper on the subject, published in the *Transactions of the Medical Society of the State of New York for 1870.* Soon after reading it a case of an aggravated character came under his observation in which a great deal of displacement presented itself. There were all the evidences of the condition described by Dr. Moore as present in dislocation of the extensor carpi ulnaris, and his method of manipulation as applied by Dr. Pilcher was successful in restoring the parts to their natural condition. Dr. Moore's bandage, as he supposed, was then applied. The case progressed to an excellent termination. When the patient was about to be discharged from treatment, Dr. Pilcher found that instead of placing his pad under the ulna, as strongly urged by Dr. Moore, he had placed it underneath the radius. The good result notwithstanding, led him to believe that the entire value of the apparatus was in the retentive bandage, and not in the particular mode of dressing or in the compress, and from that time he had thrown aside the compress and had used the retentive bandage, with the results already stated.

Dr. SANDS said he thought it would be inexcusable to make the statement that the results were uniformly good in the treatment of this fracture. He was sure he had seen bad results in old people, which were inevitable, and in a certain proportion of cases in which the fracture is severe and the patients old, more or less stiffness will be the result. He did not believe, as Dr. Briddon had already stated, that the treatment alone was responsible for such failures. He could hardly believe that any method would produce uniformly good results, and he doubted whether such a statement should receive the endorsement of the Society.

Dr. Pilcher said he hoped that nothing which he himself had said would lead to the suggestion which Dr. Sands had expressed, for he had simply stated that in the cases presented to him, and treated in this way, the results had been good. He perhaps had been fortunate in not having had presented to him any cases with the conditions which Dr. Sands had referred to, and he would dislike very much being understood as saying that there were no cases which would not result unsatisfactorily no matter what method was employed. What he had desired to emphasize was simply that in the ordinary fracture of the lower extremity of the radius the simple retentive bandage is as effective as any other method of treatment.

Dr. Sands said that was the exact point; he was unable to see how the Society could safely endorse the statement that the results are uniformly good by any method of treatment, and he was prepared to protest against it.

Dr. Gerster said that in his service during the last seven years at the German Dispensary, the number of fractures of the lower end of the radius was quite considerable, and he had, during the last five years, in a large majority of these cases, employed the simple dressing proposed by Dr. Pilcher. He had employed it where he believed it would be sufficient, and, as a rule, it had been found to be efficient in these cases. The results were certainly just as good as those obtained by any other method of treatment, but especially better than those obtained where splints had been employed which included the metacarpophalangeal joints. The majority of cases of fracture of the lower end of the radius were such, in which, so far as replacement of fragments was concerned, no difficulty was experienced, and good results were gained. If, however, long splints, including the hand, were employed, as was seen in a number of cases admitted for after-treatment, a pseudo-ankylosis of the tendons and of the small joints of the fingers was produced by the prolonged inactivity, a more serious condition than the fracture itself, especially in old people. In the cases treated by Pilcher's method the patients could almost at once resume their avocations, from the time when the bones had united. He believed the movements of the fingers, after treatment by other methods, were not as free as they are seen to be preserved under this simple retentive bandage.

He stated, on the other hand, that it is a treatment to be applied only in those cases where the replacement and retention of the fragments are easy. There are cases, fortunately not very numerous, where this retentive bandage does not suffice. It may be said that these difficult cases will give poor results under any form of treatment, but a large number of cases are such as admit of easy replacement and retention of the fragments, and in these cases Dr. Pilcher's retentive bandage had proved very satisfactory indeed.

Dr. STIMSON said, with reference to rigidity of the fingers following immobilization, that he heard with surprise the statement made by Dr. Hall, that immobilization of the fingers does not end in rigidity. He was under the impression that it is a fact of common observation. He thought, also, that it is a matter of general observation that rigidity of the fingers occurred, as in the case mentioned by Dr. Yale, when the limb was immobilized in the treatment of injuries even above the elbow. He had a case now under observation in which almost complete rigidity of the fingers followed their immobilization for two weeks in the treatment of a simple uninflamed incision of the skin of the palm.

He agreed fully with Dr. Hall concerning the absolute value of immobilization of the wrist. As to the objection raised by Dr. Hall, that passive movements of the fingers are liable to increase the inflammation within the sheaths, Dr. Stimson thought the danger a remote one, because, in the first place, the range of motion in the fingers is so slight; and, secondly, the tendons are so well protected from sharing in the primary injury, in front by the pronator quadratus, behind by the usually untorn periosteum.

The result in Dr. Hall's cases, which showed that in thirty-one cases no deformity was left, was by far better than the average, and he thought that if Dr. Gerster had heard Dr. Hall's results he would not have made the statement that the retentive bandage had given results superior to any other.

Again, the point raised by Dr. Sands that some cases do not afford good results, he thought an important one. In the patient presented by Dr. Pilcher, it seemed to him that the deformity had not been completely reduced, and that the fingers were not free now. In these cases of fracture of the lower end of the radius in which the distal fragment is split into several pieces, the chances are that recovery will take place with a limitation of motion. Furthermore, there are cases in which the intermediate spongy portion of the bone is so crushed that he thought the lower fragments could not be safely brought down without risk of failure of union; such cases are best treated without making an attempt to overcome the shortening of the radius. The resulting deformity is not great, and is not accompanied by diminution of function.

Dr. HALL said he expressly stated that immobilization in the extended position would be followed by stiffness, accompanied by discomfort to the patient. Hence, all the cases had been treated in the manner described. After effusion has taken place and fibrin been deposited, its place is taken by organized and vascularized tissue, so that in making motion blood vessels are ruptured, which gives rise to a fresh exudation that only increases the rigidity of the tendons. He should regard Dr. Pilcher's case as one in which there was marked displacement of the hand toward the radial side, with considerable limitation of motion. He had seen several fractures treated in this manner, and one in which Dr. Moore was said to have applied his own apparatus, and had not been pleased with the results as a rule. Dr. Hall failed to see how a simple band of adhesive plaster about the wrist could hold the fragments in position, when there was a tendency to recurrence of the displacement, on any mechanical theory whatever.

Dr. GERSTER said he did not wish to be understood as saying that the results obtained by him in the use of Dr. Pilcher's retentive bandage were better than any others; simply that they were fully as good as those obtained by any other treatment.

Again, he took exception to the explanation given by Dr. Hall concerning the effect produced by passive motion on the sheaths of the tendons in which exudation has taken place, as he did not believe that passive movement of a smooth tendon would increase the exudation or produce any additional amount of inflammation, nor did he believe from *a priori* reasoning that such a result was very probable.